IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

In re Patent application of:

Applicant(s):	David Alexander Gaukroger
Serial No:	10/561,495
Filing Date:	December 19, 2005
Title:	INSPECTION SYSTEM FOR AND METHOD OF INSPECTING DEPOSITS PRINTED ON WORK PIECES
Examiner:	Eric Rush
Art Unit:	2624
Docket No.	FRYHP0137US

APPEAL BRIEF

Mail Stop Appeal Brief-Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

The undersigned submits this brief for the Board's consideration of the appeal of the Examiner's decision, mailed April 14, 2009, finally rejecting claims 1-7, 9-30 and 32-45 of the above-identified application.

The fee for filing an appeal brief is being paid herewith. In the event an additional fee or further extension of time is necessary, the Commissioner is authorized to charge any additional fee which may be required, and further to consider this a petition for an extension of time to make the filing of this brief timely, to Deposit Account No. 18-0988 under Docket No. FRYHP0137US.

I. Real Party in Interest

The real party in interest in the present appeal is DEK International GmbH.

II. Related Appeals and Interferences

Neither appellant, appellant's legal representative, nor the prior assignee of the present application are aware of any appeals or interferences which will directly affect, which will be directly affected by, or which will have a bearing on the Board's decision in the pending appeal.

III. Status of Claims

Claims 1-7, 9-30 and 32-45 have been finally rejected and claims 8 and 31 have been indicated as being allowable if rewritten in independent form. The claims on appeal are claims 1-7, 9-30 and 32-45 and a correct copy of these claims is reproduced in the Claims Appendix.

IV. Status of Amendments

No claim amendments were filed subsequent to the issuance of the final Office Action, from which this appeal is taken.

V. Summary of Claimed Subject Matter

The following is a concise explanation of the subject matter defined in each of the independent claims involved in the appeal, which refers to the specification by page and line number in brackets, and to the drawing by reference characters.

Claim 1

1. An inspection system for inspecting deposits printed on workpieces (W) through a printing screen (2) [3/4-5, 27/7-9], the system comprising:

a camera unit (8) movable relative to a printing screen (2), where comprising a body including a plurality of apertures, and a workpiece (W) on which deposits are printed through the apertures of the printing screen (2) [3/6-8, 11/26-29, 12/14-15, 18/33-34]; and

a control unit (11) operable to control the camera unit (8) such as to capture images of at least one pair of corresponding regions of the printing screen (2) and the workpiece (W) [21/17-25], and process the images to determine, in turn, for each of a plurality of points defining the image of the printing screen (2), whether the point is of aperture, and, where the point is of aperture, determine whether the corresponding point of the corresponding image of the workpiece (W), as defined by a corresponding plurality of points, is of deposit, thereby enabling a determination of a print characteristic of deposits printed on the workpiece (W) from a relationship of the points determined to be of deposit to the points determined to be of aperture [3/9-18, 22/31-33, 23/19-24/18, 26/4-6].

Claim 24

24. A method of inspecting deposits printed on workpieces (W) through a printing screen (2) [3/4-5, 27/7-9], the method comprising the steps of:

capturing images of at least one pair of corresponding regions of a printing screen (2), where comprising a body including a plurality of apertures, and a workpiece (W) on which deposits are printed through the apertures of the printing screen (2) [3/6-8, 11/26-29, 12/14-15, 18/33-34]; and

processing the images to determine, in turn, for each of a plurality of points defining the image of the printing screen (2), whether the point is of aperture, and, where the point is of aperture, determine whether the corresponding point of the corresponding image of the workpiece (W), as defined by a corresponding plurality of points, is of deposit, thereby enabling a determination of a print characteristic of deposits printed on the workpiece (W) from a relationship of the points determined to be of deposit to the points determined to be of aperture [3/9-18, 22/31-33, 23/19-24/18, 26/4-6].

VI. Grounds of Objection/Rejection to Be Reviewed on Appeal

A. Claims 1, 2, 6, 9, 23-25, 29 and 32 stand rejected under 35 U.S.C. § 102(b) as being anticipated U.S. Patent No. 6,810,138 (herein referred to as "Schanz").

B. Claims 3, 5, 26 and 28 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Schanz.

C. Claims 4, 7, 10-22, 27, 30, and 33-45 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Schanz in view of U.S. Patent No. 4,578,810 (herein referred to as "MacFarlane").

VII. Argument

The rejections advanced by the Examiner are improper and should be reversed for at least the following reasons.

Summary

The present application is directed toward an inspection system for a screen printing machine that may be used to inspect deposits on a workpiece such as a circuit board. Screen printing machines are used to print deposits, such as solder paste, onto the workpiece via apertures in a printing screen. It is advantageous to then inspect the workpiece and/or printing screen using an inspection system to determine the deposit coverage, the alignment of the deposits to structures, if the apertures are blocked, etc. Camera units may be used in aligning the printing screen and the workpiece to acquire an image of a region of the workpiece and the printing screen at a plurality of inspection sites, and an inspection may be carried out.

The exemplary inspection system illustrated in Fig. 2 (reproduced below) includes a camera unit 8 movable relative to a printing screen 2 including a body having a plurality of apertures and a workpiece W on which deposits are printed through the apertures of the printing screen. A control unit 11(Fig. 1) is operable to control the camera unit 8 such as to capture images of at least one pair of corresponding regions of the printing screen 2 and the workpiece W, and to process the images to determine, in turn, for each of a plurality of points defining the image of the printing screen 2, whether the point is of aperture. Where the point is of aperture, the control unit 11 determines whether the corresponding point of the corresponding image of the workpiece W, as defined by a corresponding plurality of points, is of deposit, thereby enabling a

determination of a print characteristic of deposits printed on the workpiece W from a relationship of the points determined to be of deposit to the points determined to be of aperture.

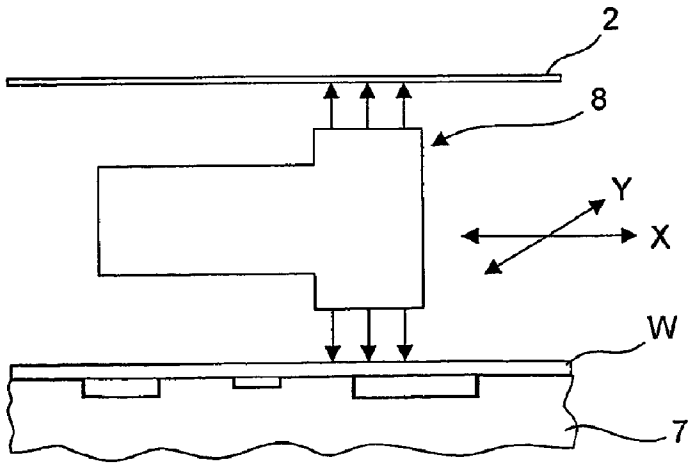

FIG. 2

By referencing points in the image of the workpiece only where the corresponding points in the image of the printing screen are determined to be of aperture and not for all points in the image of the printing screen, the image processing is simplified. The simpler image processing significantly decreases inspection times, allowing for the inspection of a greater number of inspection sites, and also avoids the need for prior recordal of a reference pattern of the printing screen 2.

A. Rejection of claims 1, 2, 6, 9, 23-25, 29 and 32 under 35 U.S.C. § 102(b)

Claims 1, 2, 6, 9, 23-25, 29 and 32 stand rejected under 35 U.S.C. § 102(b) as being anticipated by Schanz.

The Examiner's remarks in support of the rejection are as follows:

> With regards to claims 1 and 24, Schanz teaches an inspection system and method for inspecting deposits printed on workpieces through a printing screen, the system comprising: a camera unit movable relative

> to a printing screen, (Schanz, Column 5 Lines 13-40 and Lines 49-67) where comprising a body including a plurality of apertures, (Schanz, Column 6 Lines 1-23) and a workpiece on which deposits are printed through the apertures of the printing screen; (Schanz, Column 5 Lines 13-16 and Lines 57-65) and a control unit operable to control the camera unit such as to capture images of at least one pair of corresponding regions of the printing screen and the workpiece, (Schanz, Column 6 Lines 1-48) and process the images to determine**, in turn,** for each of the plurality of points defining the image of the printing screen, whether the point is of aperture, (Schanz, Column 6 Lines 1-24) and, where the point is of aperture, determine whether the corresponding point of the corresponding image of the workpiece, as defined by a corresponding plurality of points, is of deposit, (Schanz, Column 6 Lines 25-48) thereby enabling a determination of a print characteristic of deposits printed on the workpiece from a relationship of the points determined to be of deposit to the points determined to be of aperture. (Schanz, Column 6 Lines 36-56)

Office Action dated April 14, 2009, pages 2 and 3.

Reversal of the rejection is respectfully requested for at least the following reasons.

Claim 1

Schanz discloses a system and method in which images are captured from both a printing stencil 3 and a printed circuit board 5. Schanz, however, makes no disclosure or suggestion whatsoever of determining, in turn, for each of a plurality of points defining the image of the printing stencil 3, whether the point is of aperture, and, where the point is of aperture, determining whether the corresponding point of the corresponding image of the circuit board 5, as defined by a corresponding plurality of points is of deposit, in the manner required by claim 1. This determination for each point in turn, that is, on a point-by-point basis, as required by claim 1, is not disclosed or suggested by Schanz.

In Schanz, an actual pattern is compared in gross with a previously-recorded reference pattern of the printing stencil 3 (column 6, lines 36-44). The actual pattern is a solder paste application on the printed circuit board 5 (column 6, lines 42 and 43). The reference pattern represents information on the position and geometry of stencil openings in the printing stencil 3, which is previously recorded in a “teach-in method” (column 6, lines 19-24), which “teach-in method” provides for recordal of the reference pattern from a plurality of test patterns prior to initial use of the printing stencil 3 (column 1, line 64-column 2, line 8). The test patterns define "where and how" the check on the application of solder paste is to be carried out, in particular defining "the coordinates, size and shape" of the solder paste regions to be applied (column 1, lines 29-35), and, as a pixelated image would not provide any definition on where and how a check was to be made, the reference pattern manifestly cannot be a pixelated image.

Therefore, the mode of operation of Schanz is a comparison of reference and actual patterns. Moreover, the mode of operation of Schanz is manifest from the very fact that a reference pattern has first to be recorded for the printing stencil 3 in a “teach-in method”. If the mode of operation of Schanz were, as alleged by the Examiner, that of capturing corresponding images of the printing stencil 3 and the printed circuit board 5 and then effecting a point-by-point determination of the captured images in the manner as required by claim 1, there would be absolutely no need for a reference pattern. Accordingly, this comparison of an actual pattern and the reference pattern in Schanz is manifestly not the determination as required by claim 1, that is, a determination, ***in turn***, for ***each*** point of the plurality of points which define the image of

the printing stencil 3, but of the patterns *in toto*, that is, the reference and actual patterns.

The Examiner alleges in the Response to Arguments section of the Office Action that:

> Schanz teaches a comparison method between reference patterns which may be generated "in a pixel structure, in particular the coordinates, shape and size of the stencil openings, of the printing screen", and of images of the printed circuit board to determine any defects, Schanz Column 6 Lines 36-48. The Examiner asserts that this comparison, which is implemented in electronic form, is implicitly done on a pixel-by-pixel method which is effectively treating each point in turn.

Office Action Dated April 14, 2009, pages 15 and 16.

Schanz states that an image recording sensor can "generate in a pixel structure a corresponding image of the structure, in particular the coordinates, shape and size of the stencil openings, of the printing stencil 3" (column 6, lines 14-17). This passage, however, does not disclose that a comparison of the reference pattern and the actual pattern can be done on a point-by-point basis, nor does any other passage in Schanz disclose such a comparison. Further, there is nothing in Schanz that would lead one to believe that Schanz is doing anything other than a direct comparison of the patterns. All Schanz says about its comparison method is that "an assessment of the solder paste application is possible in the course of the inspection system in a particularly simple way, since it is merely necessary to carry out a comparison of the data of the reference pattern with the actual data" (column 3, lines 24-28). Accordingly, Schanz does not disclose processing the images to determine, in turn, for each of a plurality of points defining the image of the printing screen, whether the point is of aperture, and, where

the point is of aperture, determine whether the corresponding point of the corresponding image of the workpiece.

The Examiner also alleges in the response to arguments section of the Office Action that:

> On page 10 of the remarks, the Applicant's Representative argues that the independent claims of Schanz disclose the mode of operation wherein that if the method of Schanz was on a point-by-point determination there would be no need for a reference pattern, as disclosed in the claims of Schanz. The Examiner respectfully disagrees and asserts that the claims were not relied upon in the rejections. Furthermore, Schanz discloses more than just what is in the claims. The Examiner also asserts that no where in the instant claims is there a "point-by-point determination" disclosed.

Office Action Dated April 14, 2009, page 16.

As Schanz does not clearly recite its method of comparing images, the claims were referenced to show that Schanz intended its comparison to be a direct comparison of production pattern data and reference pattern data to determine conformity of an actual pattern of an application of solder paste to a desired pattern of application (column 7, lines 8-12). Accordingly, the claims provide further proof that Schanz does not disclose and did not intend to process the images to determine, in turn, for each of a plurality of points defining the image of the printing screen, whether the point is of aperture.

The Examiner also asserts that claim 1 does not disclose a point-by-point determination. To the contrary, claim 1 recites that the images are processed and a determination is made, in turn, for each of a plurality of points defining the image. The determination for each point in turn is a determination of the points on a point-by-point

basis. Accordingly, claim 1 discloses a point-by-point determination, and such a determination is absent from the disclosure of Schanz.

Notwithstanding the above distinctions, the subject-matter of claim 1 is further significantly distinguished from the disclosure of Schanz in requiring that only where a point in the image of the printing screen is determined to be of aperture is a determination made as to whether the corresponding point in the corresponding image of the workpiece is of deposit. Such a mode of operation is manifestly not disclosed or suggested by Schanz. Notwithstanding the absence of any teaching in Schanz of a point-by-point determination, there is no suggestion in Schanz of other than the comparison of the entire reference and actual images nor is there any disclosure that would lead one to believe that Schanz is capable of any other comparison.

As disclosed in the present application (page 43, final paragraph), by referencing points in the image of the workpiece only where the corresponding points in the image of the printing screen are determined to be of aperture and not for all points in the image of the printing screen, the image processing is simplified, and this simpler image processing significantly decreases inspection times, allowing for the inspection of a greater number of inspection sites, and also avoids the need for prior recordal of a reference pattern in a “teach-in method”. Accordingly, even if Schanz disclosed a point-by-point determination, which it does not, nowhere does Schanz disclose that a determination is made as to whether a corresponding point in the corresponding image of the workpiece is of deposit only where a point in the image of the printing screen is determined to be of aperture. It is noted that the Examiner did not rebut this argument presented in the response to Office Action filed December 29, 2008. The Examiner

merely stated that Schanz does disclose such a mode of operation, which, as evident from the foregoing argument, it does not.

Therefore, for the foregoing reasons, Schanz does not teach or suggest the subject matter of claim 1 and the rejection should be reversed.

Claim 24

Claim 24 discloses a method of inspecting deposits printed on workpieces through a printing screen. The method includes capturing images of at least one pair of corresponding regions of a printing screen, where comprising a body including a plurality of apertures, and a workpiece on which deposits are printed through the apertures of the printing screen. The method also includes processing the images to determine, in turn, for each of a plurality of points defining the image of the printing screen, whether the point is of aperture. Where the point is of aperture, it is determined whether the corresponding point of the corresponding image of the workpiece, as defined by a corresponding plurality of points, is of deposit, thereby enabling a determination of a print characteristic of deposits printed on the workpiece from a relationship of the points determined to be of deposit to the points determined to be of aperture. For at least the same reasons discussed with respect to claim 1, Schanz does not teach or suggest the subject matter of claim 24 and the rejection should be reversed.

Claim 2

Claim 2 depends from claim 1, and as such, is allowable for at least the same reasons discussed with respect to claim 1. Further, claim 2 additionally specifies that

the camera unit is operable simultaneously to capture images of the printing screen and the workpiece.

The Examiner's remarks in support of the rejection are as follows:

> With regards to claim 2 and 25, Schanz teaches the system and method of claims 1 and 24, wherein the camera unit is operable simultaneously to capture images of the printing screen and the workpiece. (Schanz, Column 6 Lines 1-48, Schanz teaches a camera unit consisting of two image sensors, Elements 11 and 12, which are operable to capture images simultaneously).

Office Action dated April 14, 2009, page 3.

It is acknowledged that Schanz teaches two image sensors, however, Schanz does not disclose that the image sensors simultaneously capture images of the printing screen and the workpiece. Schanz discloses that a reference pattern of the printing stencil 3 has to be recorded first in a "teach-in method". Then Schanz compares the reference pattern to the actual pattern of the circuit board after the screen printing process (see, for example, column 2, lines 2-25). Accordingly, if the mode of operation of Schanz were, as alleged by the Examiner, that of simultaneously capturing corresponding images of the printing stencil 3 and the printed circuit board 5 and then effecting a point-by-point determination of the captured images, there would be absolutely no need for the reference pattern. For this additional reason, Schanz does not teach or suggest the subject matter of claim 2.

Claim 25

Claim 25 depends from claim 24, and as such, is allowable for at least the same reasons discussed with respect to claim 24. Further, claim 25 additionally specifies that the images of the printing screen and the workpiece are captured simultaneously. For

at least the same additional reasons as discussed with respect to claim 2, Schanz does not teach or suggest the subject matter of claim 25.

B. Rejection of claims 3, 5, 26 and 28 under 35 U.S.C. § 103(a)

Claims 3, 5, 26 and 28 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Schanz.

Claims 3 and 5 depend from claim 1 and claims 26 and 28 depend from claim 24, and, as such, are themselves allowable for at least the same reasons discussed with respect to claims 1 and 24.

Claim 3

Claim 3 depends from claim 1 and additionally specifies that the camera unit is a full-area camera unit for capturing full-area images of the printing screen and the workpiece.

The Examiner's remarks in support of the rejection are as follows:

> With regards to claims 3 and 26, Schanz teaches the system and method of claims 1 and 24. Schanz teaches the use of image recording sensors to generate a pixel structure corresponding to an image. Schanz do not expressly teach wherein the camera unit is a full-area camera unit for capturing full-area images of the printing screen and the workpiece. However, the Examiner takes Official Notice of the fact that it is well known in the art to utilize full-area images to inspect workpieces. This modification would have been prompted in order to quickly accept an entire workpiece or reject an entire workpiece exhibiting defects.

Office Action dated April 14, 2009, page 5.

The Examiner acknowledges that Schanz does not teach a camera unit that is a full-area camera unit, but alleges that it would be obvious to modify Schanz to include a full-area camera. Contrary to what the Examiner alleges, however, the skilled person

would not be motivated to modify Schanz to include such a camera unit. Schanz takes test patterns of certain particularly susceptible regions and uses the test patterns to form reference patterns (column 2, lines 13-19). Taking a full-area image of the stencil would prevent Schanz from forming its reference pattern from test patterns, and because Schanz uses the reference patterns to compare to the actual patterns of the circuit board, Schanz would not be able to compare images, thereby defeating the purpose of the Schanz. For this additional reason, Schanz does not teach or suggest the subject matter of claim 3.

Claim 26

Claim 26 depends from claim 24 and additionally specifies that full-area images are captured of the printing screen and the workpiece. For at least the same additional reasons as discussed with respect to claim 3, Schanz does not teach or suggest the subject matter of claim 26.

Claim 5

Claim 5 depends from claim 1 and additionally specifies that the control unit is configured simultaneously to process the images of the printing screen and the workpiece during image capture by the camera unit.

The Examiner's remarks in support of the rejection are as follows:

> With regards to claims 5 and 28, Schanz teaches the system and method of claims 1 and 24. Schanz teaches the processing of images of the aperture and workpiece. Schanz does not expressly teach wherein the control unit is configured simultaneously to process the images of the printing screen and the workpiece during image capture by the camera unit. However, the Examiner takes Official Notice of the fact that simultaneous processing of the two corresponding images for comparison is notoriously well-known in the art. It would have been obvious to one of

ordinary skill in the art at the time of the invention to modify the teachings of Schanz to simultaneously processes the images in order to decrease the amount of information being held in static memory locations.

Office Action dated April 14, 2009, pages 5 and 6.

Schanz does not disclose simultaneously taking the images, and therefore, Schanz cannot simultaneously process the images of the printing screen and the workpiece during image capturing by the camera unit. As described above, Schanz instead discloses taking a reference pattern of the printing stencil prior to taking the actual pattern of the circuit board. See, for example, column 2, lines 2-25.

Even if Schanz disclosed simultaneously taking the images, however, Schanz states that after taking the images "it is then possible by means of the data processing electronics to evaluate the information of the two image recording sensors 11 and 12…." Column 6, lines 38-44. Accordingly, because Schanz first has to obtain its reference image and expressly states that after the images are taken is it then possible to compare the images, there is no teaching in Schanz that would lead one to believe that Schanz could be modified to simultaneously capture and process the images. For these additional reasons, Schanz does not teach or suggest the subject matter of claim 5.

Claim 28

Claim 28 depends from claim 24 and additionally specifies that the image capture and processing steps are performed simultaneously. For at least the same additional reasons as discussed with respect to claim 5, Schanz does not teach or suggest the subject matter of claim 28.

C. Rejection of claims 4, 7, 10-22, 27, 30, and 33-45 under 35 U.S.C. § 103(a)

Claims 4, 7, 10-22, 27, 30 and 33-45 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Schanz in view of MacFarlane.

Claims 4, 7 and 10-22 depend from claim 1 and claims 27, 30 and 33-45 depend from claim 24, and, as such, are themselves allowable for at least the same reasons discussed with respect to claims 1 and 24. MacFarlane does not overcome the deficiencies of Schanz as a teaching reference vis-à-vis the claimed subject matter, and accordingly the claims are allowable for this additional reason.

Claim 16

Claim 16 depends from claim 15, which depends from claim 14, and additionally specifies that the representation is of a worst case deposit.

In making the rejection, the Examiner specifically points to a passage in MacFarlane that reads:

> The logical condition to be satisfied for Sensor C is that if all A pixels are the same, then all B pixels must be the same or else there is a defect. In other words, if all A pixels are on a conductor, thus presenting an ON or ONE signal, then all B pixels must also be on a conductor or else there is a small area defect in the PWB pattern. The converse is also true; that if all A pixels are on an insulator, all B pixels should present a ZERO indicating an insulator image.

Column 13, lines 26-34.

This passage discloses determining a small area defect using a logical condition. Nowhere in the passage does it make reference to a print characteristic provided as a representation of a worst case deposit, and accordingly, for this additional reason, the combination of Schanz and MacFarlane does not teach or suggest the subject matter of claim 16.

Claim 39

Claim 39 depends from claim 38, which depends from claims 37, and additionally specifies that the representation is of a worst case deposit. For at least the same additional reasons as discussed with respect to claim 16, the combination of Schanz and MacFarlane does not teach or suggest the subject matter of claim 39.

Claim 18

Claim 18 depends from claim 17, which depends from claim 11, and additionally specifies that the representation for each inspection site is of a worst case deposit in the respective inspection site.

As stated above regarding claim 16, the passage cited by the Examiner discloses determining a small area defect using a logical condition. Nowhere in the passage does it make reference to a print characteristic provided as a representation of a worst case deposit. Accordingly, for this additional reasons, the combination of Schanz and MacFarlane does not teach or suggest the subject matter of claim 18.

Claim 41

Claim 41 depends from claim 40, which depends from claim 34, and additionally specifies that the representation for each inspection site is of a worst case deposit in the respective inspection site. For at least the same additional reasons as discussed with respect to claim 18, the combination of Schanz and MacFarlane does not teach or suggest the subject matter of claim 41.

VIII. Conclusion

In view of the foregoing, it is respectfully submitted that the claims are patentable over the applied art and that the rejections advance by the Examiner should be reversed.

Respectfully submitted,

RENNER, OTTO, BOISSELLE & SKLAR, L.L.P.

/Patrick F. Clunk /

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Claims Appendix

1. An inspection system for inspecting deposits printed on workpieces through a printing screen, the system comprising:

a camera unit movable relative to a printing screen, where comprising a body including a plurality of apertures, and a workpiece on which deposits are printed through the apertures of the printing screen; and

a control unit operable to control the camera unit such as to capture images of at least one pair of corresponding regions of the printing screen and the workpiece, and process the images to determine, in turn, for each of a plurality of points defining the image of the printing screen, whether the point is of aperture, and, where the point is of aperture, determine whether the corresponding point of the corresponding image of the workpiece, as defined by a corresponding plurality of points, is of deposit, thereby enabling a determination of a print characteristic of deposits printed on the workpiece from a relationship of the points determined to be of deposit to the points determined to be of aperture.

2. The system of claim 1, wherein the camera unit is operable simultaneously to capture images of the printing screen and the workpiece.

3. The system of claim 1, wherein the camera unit is a full-area camera unit for capturing full-area images of the printing screen and the workpiece.

4. The system of claim 1, wherein the camera unit is a line-scan camera unit for capturing line-scan images of the printing screen and the workpiece.

5. The system of claim 1, wherein the control unit is configured simultaneously to process the images of the printing screen and the workpiece during image capture by the camera unit.

6. The system of claim 1, wherein the control unit is configured to process the captured images subsequent to acquisition.

7. The system of claim 1, wherein the images of the printing screen and the workpiece are defined by respective ones of screen and workpiece signals having intensities in dependence upon the imaged features, with the points defining each of the images being time-sliced components of the respective screen and workpiece signals.

9. The system of claim 1, wherein the images of the printing screen and the workpiece are pixelated images, with the points defining each of the images being pixels of the pixelated images.

10. The system of claim 9, wherein the relationship of the points determined to be of deposit to the points determined to be of aperture is determined from a number count of the number of pixels determined to be of deposit relative to the number of pixels determined to be of aperture.

11. The system of claim 9, wherein the control unit is configured to acquire a plurality of pairs of corresponding images of the printing screen and the workpiece in accordance with an inspection schedule defining a plurality of inspection sites at which images are in use acquired.

12. The system of claim 11, wherein the inspection sites of the inspection schedule are determined in a set-up routine.

13. The system of claim 12, wherein an offset in the corresponding pair of images of the printing screen and the workpiece as acquired by the camera unit at each inspection site is predetermined, such that the pixel in an image of the workpiece corresponding to a pixel in the corresponding image of the printing screen is determined in accordance with the offset.

14. The system of claim 1, wherein the print characteristic comprises a representation of a percentage of a determined deposit coverage as compared to an expected deposit coverage.

15. The system of claim 14, wherein the print characteristic is provided as a representation for all deposits.

16. The system of claim 15, wherein the representation is of a worst case deposit.

17. The system of claim 11, wherein the print characteristic comprises a representation of a percentage of a determined deposit coverage as compared to an expected deposit coverage, and the print characteristic is provided as a plurality of representations for the inspection sites.

18. The system of claim 17, wherein the representation for each inspection site is of a worst case deposit in the respective inspection site.

19. The system of claim 17, wherein the representation for each inspection site comprises a plurality of representations corresponding to at least ones or groups of ones of the deposits in the respective inspection site.

20. The system of claim 1, wherein the points determined to be of deposit are determined by reference to a reference threshold value of image intensity.

21. The system of claim 20, wherein, for at least one of the apertures, the points determined to be of deposit are determined as having an image intensity one of above or below a reference threshold value of image intensity.

22. The system of claim 20, wherein, for at least one of the apertures, the points determined to be of deposit are determined as having an image intensity within upper and lower bounding limits of a reference threshold value of image intensity.

23. A screen printing machine incorporating the inspection system of claim 1.

24. A method of inspecting deposits printed on workpieces through a printing screen, the method comprising the steps of:

capturing images of at least one pair of corresponding regions of a printing screen, where comprising a body including a plurality of apertures, and a workpiece on which deposits are printed through the apertures of the printing screen; and

processing the images to determine, in turn, for each of a plurality of points defining the image of the printing screen, whether the point is of aperture, and, where the point is of aperture, determine whether the corresponding point of the corresponding image of the workpiece, as defined by a corresponding plurality of points, is of deposit, thereby enabling a determination of a print characteristic of deposits printed on the workpiece from a relationship of the points determined to be of deposit to the points determined to be of aperture.

25. The method of claim 24, wherein the images of the printing screen and the workpiece are captured simultaneously.

26. The method of claim 24, wherein full-area images are captured of the printing screen and the workpiece.

27. The method of claim 24, wherein line-scan images are captured of the printing screen and the workpiece.

28. The method of claim 24, wherein the image capture and processing steps are performed simultaneously.

29. The method of claim 24, wherein the processing step is performed subsequent to the image capture step.

30. The method of claim 24, wherein the images of the printing screen and the workpiece are defined by respective ones of screen and workpiece signals having intensities in dependence upon the imaged features, with the points defining each of the images being time-sliced components of the respective screen and workpiece signals.

32. The method of claim 24, wherein the images of the printing screen and the workpiece are pixelated images, with the points defining each of the images being pixels of the pixelated images.

33. The method of claim 32, wherein the relationship of the points determined to be of deposit to the points determined to be of aperture is determined from a number count of the number of pixels determined to be of deposit relative to the number of pixels determined to be of aperture.

34. The method of claim 32, wherein, in the image capture step, a plurality of pairs of corresponding images of the printing screen and the workpiece are acquired at a plurality of inspection sites in accordance with an inspection schedule.

35. The method of claim 34, further comprising the step of:
performing a set-up routine to determine an inspection schedule defining a plurality of inspection sites at which images are to be acquired.

36. The method of claim 35, wherein, in the set-up routine, an offset in the corresponding pair of images of the printing screen and the workpiece at each inspection site is determined, and, in determining the pixel in an image of the workpiece corresponding to a pixel in the corresponding image of the printing screen, the pixel in the image of the workpiece corresponding to the pixel in the corresponding image of the printing screen is determined in accordance with the offset.

37. The method of claim 24, wherein the print characteristic comprises a representation of a percentage of a determined deposit coverage as compared to an expected deposit coverage.

38. The method of claim 37, wherein the print characteristic is provided as a representation for all deposits.

39. The method of claim 38, wherein the representation is of a worst case deposit.

40. The method of claim 34, wherein the print characteristic comprises a representation of a percentage of a determined deposit coverage as compared to an expected deposit coverage, and the print characteristic is provided as a plurality of representations for the inspection sites.

41. The method of claim 40, wherein the representation for each inspection site is of a worst case deposit in the respective inspection site.

42. The method of claim 40, wherein the representation for each inspection site comprises a plurality of representations corresponding to at least ones or groups of ones of the deposits in the respective inspection site.

43. The method of claim 24, wherein each corresponding point of the corresponding image of the workpiece is determined to be of deposit by reference to a reference threshold value of image intensity.

44. The method of claim 43, wherein, for at least one of the apertures, each corresponding point of the corresponding image of the workpiece is determined to be of deposit in having an image intensity one of above or below a reference threshold value of image intensity.

45. The method of claim 43, wherein, for at least one of the apertures, each corresponding point of the corresponding image of the workpiece is determined to be of deposit in having an image intensity within upper and lower bounding limits of a reference threshold value of image intensity.

Evidence Appendix

None.

Related Proceedings Appendix

None.